
IN RE: ELECTRONIC BOOKS ANTITRUST
LITIGATION

No. 11-md-02293 (DLC)
ECF Case

THE STATE OF TEXAS, et al.,
Plaintiffs

v.

No. 12-cv-03394 (DLC)
ECF Case

PENGUIN GROUP (USA), INC., et al.,
Defendants

DECLARATION OF ROGER G. NOLL

My name is Roger G. Noll, and I reside in Palo Alto, California. I am Professor *Emeritus* of Economics at Stanford University, and Senior Fellow in the Stanford Institute for Economic Research, where I am Director of the Program in Regulatory Policy. My educational background includes a B.S. in mathematics from the California Institute of Technology and a Ph.D. in economics from Harvard University. My primary field of research and teaching is industrial organization, which includes antitrust economics. I have taught antitrust to undergraduate and graduate students for nearly 50 years. I have published over 300 scholarly articles, books and reviews, many of which deal with antitrust and/or the information technology sector of the economy. My *curriculum vita* is attached as Appendix A to this declaration.

I have served as a consultant in the following cases that are still pending or that have

been concluded in the last five years.

Testimony at Trial

Bernard Parish, et al., vs. National Football League Players Association (U.S. District Court, San Francisco);

Application of MobiTV Related to U.S. vs. ASCAP (U.S. District Court, New York City);

Reggie White, et al., vs. NFL: Lockout Insurance & Lockout Loans (U.S. District Court, Minneapolis);

SmithKline Beecham d/b/a GlaxoSmithKline vs. Abbott Laboratories (U.S. District Court, Oakland);

Novell vs. Microsoft (U.S. District Court, Salt Lake City);

DVD CCA vs. Kaleidescape (Superior Court, San Jose); and

In the Matter of Adjustment of Rates and Terms for Pre-existing Subscription and Satellite Digital Audio Radio Service (Copyright Royalty Board, Washington, D. C.).

Declarations, Expert Reports and/or Depositions

National Association of Optometrists and Opticians, et al., vs. Lockyer, et al. (U.S. District Court, Sacramento);

In re: Dynamic Random Access Memory (DRAM) Antitrust Litigation (U.S. District Court, San Francisco);

Joel I. Roos and Tom Santos, et al., vs. Honeywell International (Superior Court, San Francisco);

Vincent Fagan and Anthony Gianasca vs. Honeywell International (Superior Court for

Middlesex County, Boston, Massachusetts);

John McKinnon vs. Honeywell International (Superior Court for York County, Alfred, Maine);

Eric Seiken vs. Pearle Vision (Superior Court for San Diego County, San Diego);

Jason White, et al., vs. National Collegiate Athletic Association (U.S. District Court, Los Angeles);

In Re Static Random Access Memory (SRAM) Antitrust Litigation (U.S. District Court, San Francisco);

Fair Isaac, et al., vs. Equifax, et al. (U.S. District Court, Minneapolis);

Apple iPod iTunes Anti-Trust Litigation (U.S. District Court, San Jose);

Minority Television Project vs. Federal Communications Commission (U.S. District Court, San Francisco);

In re: Flash Memory Antitrust Litigation (U.S. District Court, Oakland);

In re: Applications of AT&T Mobility, Ericsson and Verizon Wireless, Related to U.S. vs. ASCAP (U.S. District Court, New York City);

Sarah Perez, et al., vs. State Farm Mutual Automobile Insurance Co., et al. (U.S. District Court, San Jose);

Federal Trade Commission vs. Cephalon (U.S. District Court, Philadelphia);

In re: Text Messaging Antitrust Litigation (U.S. District Court, Chicago);

In re: NCAA Student Athlete Name and Likeness Licensing Litigation (U.S. District Court, Oakland); and

City of San Jose, et al., vs. Office of the Commissioner of Baseball, et al. (U.S. District Court, San Jose).

Amicus Submissions

PSEG Fossil, et al., vs. Riverkeeper Inc. (U.S. Supreme Court);

American Needle vs. National Football League (U.S. Supreme Court); and

Petition to Reconsider Sports Blackout Rules (Federal Communications Commission).

ASSIGNMENT

Attorneys for the plaintiffs in this litigation have asked me to calculate the damages to purchasers of e-books arising from the conspiracy found by the Court in the *Opinion and Order* in *United States v. Apple* and *State of Texas v. Penguin Group (USA), Inc.* (henceforth *Opinion*). Attorneys for the class plaintiffs also have asked me to determine whether anticompetitive harm arising from the conspiracy can be demonstrated for all class members, and whether the method for calculating damages to individual consumers is common to class members. Attorneys for both types of plaintiffs also have asked me to disaggregate the damages calculations among the states and territories of the U.S.

To undertake this task, I have read the *Second Amended Complaint* of the states (henceforth, *State Complaint*), the *Consolidated Class Action Complaint* and the *Proposed Consolidated First Amended Class Action Complaint* of the class plaintiffs (henceforth, *Class Complaint* refers to the *Proposed Consolidated First Amended Class Action Complaint*), and the *Opinion* in the liability phase of the antitrust complaints by the states and the U.S. Department of Justice. In addition, either I or the economists who have supported me have read documents that have been produced in this matter, the economic expert reports that were submitted in the liability phase of this litigation, and testimony in depositions and at trial. The materials that I have considered are listed in Appendix B to this report. In undertaking this assignment, I have

been assisted by the staffs of Laurits R. Christensen Associates and of Ashenfelter & Ashmore. For my work in this matter, I am being compensated at the rate of \$800 per hour.

SUMMARY AND CONCLUSIONS

In undertaking the analysis of the issues that plaintiffs’ attorneys have asked me to address, my starting point is the *Opinion* of the Court in the liability phase of the litigation involving the state plaintiffs. The Court found that “Plaintiffs have shown through compelling evidence that Apple violated Section 1 of the Sherman Act by conspiring with the Publisher Defendants to eliminate retail price competition in order to raise e-book prices,” and that “Apple played a central role in facilitating and executing that conspiracy” (*Opinion*, pp. 9, 113). The *Opinion* also documents how consumers of e-books suffered anticompetitive harm from higher e-book prices and from being excluded from the market for e-books due to higher prices (*Opinion* pp. 94-99, 121-22).

After considering the *Opinion*, I identified my remaining tasks as showing the following: (1) consumers suffered anticompetitive harm due to increased prices for e-books; (2) a reliable damages method exists for calculating both total damages and damages for each consumer using a method that is common to class members; and (3) damages can be disaggregated among states and territories of the U.S.

One element of anticompetitive harm is the transfer of wealth from consumers to sellers as a result of prices that are elevated due to anticompetitive conduct. Thus, successfully showing that consumers were damaged by paying supracompetitive prices demonstrates that they suffered anticompetitive harm. Because class members are defined as having purchased e-books from the Publisher Defendants during the period of the anticompetitive conduct, and because

anticompetitive conduct by the defendants caused prices to be higher for e-books that account for 99.5 percent of e-book sales by the Publisher Defendants, I conclude that the requirement to show class-wide anticompetitive harm is satisfied.

The method that I chose to calculate damages is the “before-after” approach, which uses prices that were not affected by the anticompetitive conduct to calculate competitive benchmark prices for e-books sold by the Publisher Defendants during the period in which anticompetitive conduct occurred. To calculate damages, economists working under my direction estimated an econometric model that implements a hedonic price formula that measures the effect of collusion by including an indicator variable for the period that was affected by anticompetitive conduct. The data that were used to estimate the econometric model include sales data for each e-book title that were aggregated into four-week periods to make estimation more tractable. The model includes variables to capture economic conditions that can affect price and attributes of titles, such as the genre of the e-book, whether it was a bestseller, and whether it was available in a physical copy edition. The estimated equation yields a formula for calculating the predicted price of each e-book title in each four-week period without the effect of the anticompetitive conduct. Damages for each sale of each e-book title in each period are then the actual price minus the predicted, but-for price. Retailers of e-books maintain records of individual transactions. The transactions records can be used to calculate damages for each e-book customer by summing the damages for each title that was purchased by that customer, thereby producing damages as well as proof of anticompetitive harm for every consumer in the class using a formula that is common to class members. The total damages arising from these calculations are \$307,808,440. The damages calculations are summarized in Exhibit 2.

These damages were allocated among the states based on the individual transactions data

from Amazon, Apple and Sony, and distributions of sales data by state from Barnes & Noble. From these data sales of e-books were allocated to each state and territory for e-retailers that account for 98 percent of all e-book sales.

Based on this analysis, I conclude that reliable methods of economic analysis can be used to prove class-wide impact, to calculate damages for individual class members using methods that are common to class members, to calculate total damages arising from the anticompetitive conduct of the defendants, and to disaggregate these damages among the states and territories. The remainder of this report contains the basis for these conclusions.

ASSESSING ANTICOMPETITIVE IMPACT

The harm to class plaintiffs from the anticompetitive conduct of the defendants can be demonstrated by methods that are predominantly common to the class. That is, the method for showing anticompetitive harm is based on evidence and analysis that would be largely duplicative if each class member were to file a separate antitrust complaint. The *Class Complaint* (p. 71) defines the class as follows. “The Federal Class consists of all persons in the Non-Litigating Jurisdictions who purchased e-books published by Hachette, HarperCollins, Macmillan, Penguin, or Simon & Schuster directly from that publisher after the adoption of the agency model by that publisher.”¹ This section identifies the harm to consumers that arose from anticompetitive conduct by the defendants. The next section explains how damages, which are a component of anticompetitive harm, reliably can be calculated for consumers who are represented by the state plaintiffs and for consumers who are members of the class.

Economists measure the impact of anticompetitive conduct by examining the effect of

¹ The “Non-Litigating Jurisdictions” are American Samoa, California, Florida, Georgia, Guam, Hawaii, Kentucky, Maine, Minnesota, Mississippi, Montana, Nevada, New Hampshire, New Jersey, North Carolina, Northern Mariana Islands, Oklahoma, Oregon, Rhode Island, South Carolina, U.S. Virgin Islands, Washington, and Wyoming.

conduct on performance in markets that are affected by that conduct. Hence, the method for demonstrating anticompetitive harm to consumers must be based on an economic analysis of liability issues. The essence of an economic analysis of liability is to determine whether the defendants obtained and exercised incremental market power by engaging in anticompetitive conduct. Thus, the starting place to analyze anticompetitive harm is the nature of the anticompetitive conduct by the defendants.

Defendants' Anticompetitive Conduct

In the *Opinion*, the Court determined that the defendants engaged in anticompetitive conduct. “The Plaintiffs have shown that the Publisher Defendants conspired with each other to eliminate retail price competition in order to raise e-book prices, and that Apple played a central role in facilitating and executing that conspiracy.” (*Opinion*, p. 9.) “The Plaintiffs have shown through compelling evidence that Apple violated Section 1 of the Sherman Act by conspiring with the Publisher Defendants to eliminate retail price competition and to raise e-book prices. There is overwhelming evidence that the Publisher Defendants joined with each other in a horizontal price-fixing conspiracy.” (*Opinion*, p. 113.) The starting place for my analysis is that the existence of anticompetitive conduct through price fixing has been established and that the tasks at hand are to quantify the magnitude of the effect and to show that this conduct caused harm to class members that can be proved by a method that is common to class members. To undertake these tasks requires understanding the details of how the price-fixing conspiracy actually worked to raise prices.

An important element of the price-fixing conspiracy was “to move from a wholesale model – where a publisher receives its designated wholesale price for each e-book and the

retailer sets the retail price – to an agency model, where a publisher sets the retail price and the retailer sells the e-book as its agent” (*Opinion*, p. 12). In the defendants’ collusive agency model new releases of e-books were placed in categories, each of which had a specified retail price that was higher “for many books” than the prices that had been charged by Amazon (*Opinion*, p. 12). While technically the prices were expressed as caps, the expectation and ultimate reality was that the caps would be the actual prices at which nearly all e-books were sold. “Just as Apple expected, after the iBookstore opened in April 2010, the price caps in the Agreements became the new retail prices for the Publisher Defendants’ e-books” (*Opinion*, p. 94).

Although the collusive agency model was developed in collaboration with Apple and made part of Apple’s contracts with the publisher defendants, a provision in the Apple contracts caused the model to apply to all e-book retailers. These contracts contained a “most favored nation” (MFN) provision that allowed Apple to match the lowest retail price that was set by any other retailer and “imposed a severe financial penalty upon the Publisher Defendants if they did not force Amazon and other retailers similarly to change their business models and cede control over e-book pricing to the Publishers” (*Opinion*, p. 12).

A striking feature of this litigation is that both plaintiffs and defendants generally agree that the purpose and effect of the switch to the agency model was to cause average retail e-book prices for books sold by the publisher defendants to rise. The Publisher Defendants sought higher retail e-book prices as a means to slow the erosion of retail prices of both e-books and physical copies, to slow the transition from sales of physical copies, especially from brick-and-mortar book stores, and to curb the growing dominance of Amazon in book retailing (*Opinion*, pp. 15-26).² Apple sought freedom from price competition and a guaranteed profit margin when

² The Publisher Defendants tried other strategies to achieve these goals before adopting the

it added e-books to its online digital distribution business (the iBookstore) in connection with Apple's release of the iPad, which Apple knew would be a high-quality device for e-reading and so would compete effectively against Amazon's Kindle for consumers who wanted to use a tablet to read e-books (*Opinion*, pp. 24-30).

Together Apple and the Publisher Defendants developed the agency model, which is a procedure for setting retail and wholesale prices plus an enforcement mechanism, the MFN, to guarantee compliance with the pricing agreement. The issue in the liability phase was not whether the agency model, if adopted by a single publisher, is itself anticompetitive, but whether mutual agreement among the Publisher Defendants and Apple about the parameters of pricing occurred and constituted collusion to eliminate competition (*Opinion*, pp. 132, 138). The *Opinion* found (pp. 132-34) that a joint agreement about the terms of the agency model that involved publishers accounting for a large proportion of e-book sales was anticompetitive. The agency model involved increasing the retail prices of many e-books from Amazon's \$9.99³ to \$12.99 or \$14.99, a guaranteed 30 percent margin between retail and wholesale prices, a cut in some wholesale prices, and an MFN to guarantee that Amazon and other e-retailers would be forced to accept the same agreement (*Opinion*, pp. 34-59).

The collusive agency model gave the Publisher Defendants a means to force Amazon to raise its prices and to reduce their reliance on Amazon as a book retailer, and Apple the

agency model, including an elimination of the difference in wholesale prices (reflecting differences in costs) between physical copies and e-books, and creating a "window" (or delay) in the release of new books between physical copies and e-books.

³ Amazon's pricing formula at the time the agency model was adopted was to set e-book prices on the basis of the list price, but always to meet the price of a competitor. For new releases with a list price for physical copies of under \$25 and for books on the New York Times best seller list, the standard price was \$9.99. See Bates No. AMZN-TXCID-0009667-8. Amazon's pricing formula defined a new release as an e-book that had been available for fewer than 90 days, which is shorter than the definition of a "new release" in the agency agreements. In my econometric model for calculating prices in the absence of collusion, I use Amazon's definition.

combination of a new product (the iPad) for competing against Amazon's Kindle with parallel protection against price competition in e-books from the established, dominant retailer. The agreement was anticompetitive because it was implemented cooperatively by the defendants to override independent decisions by publishers and retailers for the purposes of raising prices and retarding the growth of a new technology that consumers preferred.

Anticompetitive Harm

An economic analysis of the harm to competition arising from anticompetitive conduct focuses on harm to consumers that arises because competition among sellers is suppressed – in this case by the price-fixing conspiracy that was found by the Court. The anticompetitive harm is the departure of market outcomes from the outcomes that would have occurred in the absence of anticompetitive conduct. The collusive agency model distorted market outcomes by raising e-book prices and reducing e-book sales. The task of an economic analysis of anticompetitive harm is to explain and, where possible, quantify the distortions that arose because of this anticompetitive conduct. Economic theory leads to the conclusion that the collusive agency agreement is likely to have had anticompetitive effects on e-book prices and the speed with which new e-book technology was adopted. These effects cause anticompetitive harm to consumers in the following ways.

Higher Prices for e-Books

One purpose of the collusive agency model was to cause prices of e-books to be higher, thereby causing harm to consumers that is equal to the difference between the elevated e-book prices under the collusive agency model and the lower e-book prices that would have occurred

had this collusive agreement not been adopted. The transfer of wealth from consumers to retailers and publishers from higher prices is an anticompetitive harm and is the standard measure of damages in antitrust cases, as is discussed in the damages section of this declaration. This wealth transfer is the sum over all e-book titles and all days for which the collusive agency model was in place of the quantity sold multiplied by the elevation in price on that day due to the collusive agency model.

This expectation was confirmed as average e-book prices of the Publisher Defendants rose immediately after the agency model came into effect. “The analysis presented by the Plaintiffs’ experts as well as common sense lead invariably to a finding that the actions taken by Apple and the Publisher Defendants led to an increase in the price of e-books” (*Opinion*, p. 99).

Dead-Weight Loss from Higher e-Book Prices

Higher prices for e-books cause “dead-weight loss,” which is the loss of consumer welfare arising from the reduction in sales that is caused by higher prices. In almost all circumstances, the relationship between the price of a product and the quantity sold at that price is negative – that is, higher prices cause fewer units to be sold. Here the Court found that “it is abundantly clear, and not surprising, that each of the Publisher Defendants lost sales of e-books due to the price increases.” (*Opinion* p. 98.)

A consumer who would buy a particular e-book title at a lower price, but who decides not to buy at the higher price, suffers a loss equal to the net benefit to the consumer of the foregone purchase at the lower price. Economists measure this loss of consumer welfare as the difference between the maximum price that the purchaser would have been willing to pay and the lower price that otherwise would have occurred. If the relationship between price and quantity sold is

linear, the welfare loss to purchasers from an elevated price is given by the following formula:

$$\text{Dead-Weight Loss} = -\frac{1}{2}(dQ)(dP),$$

where dQ is the fall in the quantity that is sold and dP is the increase in the price.

For example, Professor Orley Ashenfelter calculated that the average increase in prices for the Publisher Defendants relative to Random House titles was 16.8% and the relative decline in unit sales was 14.5%.⁴ Under the assumption that Random House provides a competitive benchmark for prices and sales of e-books that were sold by the Publisher Defendants during the agency period, these calculations can be used to provide a rough estimate of the dead-weight loss to consumers from this switch.⁵ The approximate dead-weight loss from this price increase and sales decline is about 1.2% of retail e-book sales revenue of the Publisher Defendants.

Spillover Effects on e-Reader Devices

In the liability litigation, Apple's economic experts attempted to justify Apple's conduct by arguing that the collusive agreement created pro-competitive benefits related to e-reader devices and the introduction of the iPad. The Court found that these events "are phenomena that are independent of the Agreements and therefore do not demonstrate any pro-competitive effects flowing from the Agreements" (*Opinion* p. 121) and that "Plaintiffs have carried their burden to show a violation of Section 1 of the Sherman Act" under a rule of reason analysis, as well as a per se analysis (*Opinion*, p. 122). While this declaration does not analyze any arguments that Apple may still put forth regarding pro-competitive benefits, here I briefly explain how the

⁴ *Direct Testimony of Orley C. Ashenfelter*, p. 6.

⁵ This calculation is an approximation because it is based on average price increases and reductions in sales. The actual dead weight would be calculated by measuring the effect in each category of e-books for which retail prices are the same, and then summing the calculations for all categories. The calculations here illustrate the method and are accurate for e-book categories with average price increases and sales declines.

Court's findings are consistent with economic theory.

One purpose of the collusive agency model was to distort the distribution of book sales between brick-and-mortar stores and Internet retailers, and between physical and electronic copies. The Publisher Defendants were willing to cut wholesale prices for many e-books, and thereby to obtain lower profits from e-book sales, to protect more profitable sales of physical copies and to redirect consumers from on-line retailers to brick-and-mortar stores. Distorting the distribution of business between types of retail competitors is an anticompetitive harm because it imposes a penalty on consumers for using a technology for consuming books that they prefer.

The decision by a consumer to buy an electronic device that can be used as an e-reader is based on the expected net benefit of the device. Higher prices for e-books are like a tax on e-reading that reduces the value of an e-reader as well as the net value of e-books. This effect is greatest for specialized devices that are used only or primarily as e-readers, such as the versions of the Barnes & Noble Nook, Amazon Kindle, and Sony e-Reader that were available when the collusive agency model was adopted. The effect of an increase in e-book prices on the demand for tablet computers, like the iPad, would not be as great because they have a greater variety of uses and hence a smaller proportion of their net benefit is derived from e-reading.

The replacement of an old technology by a new one often is disruptive, but collusion among sellers to slow change in order to reduce the effect of disruption on them causes anticompetitive harm to consumers. Here the Court found that the Defendants' collusive agency model and higher prices had no pro-competitive benefits (*Opinion*, p. 121).

Quantifying the Direct Harm from Higher e-Book Prices

The first anticompetitive harm is the effect on consumers from paying higher e-book

prices for the e-books that they buy. The *Opinion* found that the immediate effect of the implementation of the agency agreement was to cause e-book prices to rise.

In the five months after the iBookstore entered in April 2010, “the Publisher Defendants collectively priced 85.7% of their New Release titles sold through Amazon and 92.1% of their New Release titles sold through Apple within 1% of the price cap. This was also true for 99.4% of the NYT Bestseller titles on Apple’s iBookstore, and 96.8% of NYT Bestsellers sold through Amazon. The increase at Amazon within roughly two weeks of moving to agency amounted to an average per unit e-book retail price increase of 14.2% for their New Releases, 42.7% for their NYT Bestsellers, and 18.6% across all of the Publisher Defendants’ e-books.” (*Opinion*, p. 94.)

The *Opinion* includes a chart (p. 95) that depicts the average e-book price for each publisher, and shows that average prices of books sold by the five Publisher Defendants all rose dramatically in April 2010, when the agency model took effect, and persisted until January 2011, when the chart ends, while the average prices for publishers who were not part of the conspiracy fell slightly over the first nine months of the agency period.

The evidence cited in the *Opinion* establishes the existence of anticompetitive harm from the anticompetitive conduct of the defendants during the months following the adoption of the collusive agency model. Following the findings in the *Opinion*, I have undertaken an analysis of e-book pricing that shows that consumers suffered anticompetitive harm over the entire class period, and demonstrates that damages to consumers can be calculated using a method that is common to class members. The method for calculating damages must include the overcharges to consumers for the entire period that the collusive agency model was in effect, rather than simply demonstrate that the immediate impact was to cause prices to go up. In addition, the method for calculating damages must allow damages, and hence the damages component of anticompetitive

harm, reliably to be calculated for each consumer.

DAMAGES

The fact of harm arising from anticompetitive conduct by the defendants has been established by showing that, among other harms, the average retail price of e-books that were sold by the Publisher Defendants increased as a result of the adoption of the collusive agency model. This section presents a reliable method for calculating damages on the basis of transactions of each individual e-book. The overcharge due to collusion is calculated for each specific title that was sold by each Publisher Defendant for each retailer during each month that the agency model was in effect for that publisher. The relevant consumers are purchasers of e-books from the Publisher Defendants during the period when the collusive agency model was in force. For each member of the class the reliably quantifiable damages and anticompetitive harm from higher e-book prices are the sum of the overcharges for each e-book that that customer purchased. The formula for calculating damages at the level of transactions for each e-book title is an econometric model of pricing by the Publisher Defendants that is estimated from these transaction data. The details about the data and the econometric model are described in the remainder of this section.

Methods for Calculating Damages

The method that I have adopted for calculating damages is the “before-after” approach. Under this method, prices prior to or after the anticompetitive conduct are used to calculate a “competitive benchmark” for the period in which anticompetitive conduct occurred, and damages are then the difference between the actual higher prices and the benchmark prices

multiplied by the quantity of sales at the elevated price. The formula for calculating the difference between the competitive benchmark price and the actual price is an econometric equation that uses a hedonic pricing model to estimate the relationship between the attributes of an e-book, including the e-retailer from which it was purchased, and the price of the e-book.

The before-after method is widely used by economists to calculate damages in antitrust cases. Professors Kip Viscusi, Joseph Harrington, and John Vernon state the general principle: “Standard antitrust practice is to calculate damages... as the additional revenue on the units sold.”⁶ Professors Roger Blair and David Kaserman summarize the standard approaches in antitrust economics by stating that “the measure of damage is roughly equal to the wealth transferred to the monopolist from the buyers.”⁷ They list “three basic theories of how one goes about measuring... overcharges” and one is the “before and after theory.”⁸

Dr. John Johnson, a vice president of NERA Economic Consulting, also has written about damages.⁹ Dr. Johnson states: “Several common models are frequently used in antitrust cases and have been accepted by courts under Daubert standards as a reliable approach to calculating damages.”¹⁰ The first he calls the “benchmark or straight-line model,” which he then describes as the before-after test.¹¹ Professor John Connor of Purdue was asked by the Amsterdam Centre for Law and Economics to prepare a paper on “Forensic Economics in Competition Law and

⁶ W. Kip Viscusi, Joseph E. Harrington, Jr., and John M. Vernon, *Economics of Regulation and Antitrust*, 4th Edition, MIT Press, 2005, p. 145.

⁷ Roger D. Blair and David L. Kaserman, *Antitrust Economics*, Richard D. Irwin, 1985, p. 78. The term “monopolist” here refers to those who engaged in anticompetitive conduct and so includes members of a price-fixing cartel.

⁸ *Ibid.*, pp. 78-79.

⁹ John Johnson, “Economic Approaches to Antitrust Damage Estimation,” NERA Economic Consulting, January 2005.

¹⁰ *Ibid.*, p. 6.

¹¹ *Ibid.*, pp. 6-7.

Policy.”¹² In his paper, Professor Connor discusses damages methods. According to Professor Connor: “The principal challenge for forensic economists is to calculate the relative competitive benchmark price...”¹³ He then goes on to describe the principal methods of calculating damages, one of which is the “before and after method” (which he dates to the 1920s).¹⁴

Implementation of the before-after model requires developing a procedure for using prices that are charged in the absence of anticompetitive conduct to estimate the prices that would have been charged during the period in which the anticompetitive conduct occurred. For e-books, this process is complicated by the facts that books in any format are differentiated products – that is, different books have different attributes that lead to differences in prices. To implement the before-after test requires recovering the process that determines differences in prices among differentiated products. Economists developed the “hedonic pricing model” to measure the effect of product attributes on price.¹⁵ A hedonic pricing model explains prices in an equation in which the dependent variable is price and the independent variables include measures of product attributes that lead to differences in prices. In the past I have used hedonic price models successfully in antitrust cases, including cases in which a class has been certified.¹⁶

Data for a Damages Model

The sales data that are used in the regression analysis are transactions records that are

¹² John M. Connor, “Forensic Economics: An Introduction with Special Emphasis on Price Fixing,” Amsterdam Centre for Law and Economics, ARP No. 2006-17888, March 2006.

¹³ *Ibid.* The manuscript is not paginated. If it were, the quote would appear on pages 14-15.

¹⁴ *Ibid.*, pseudo-pp. 15-18.

¹⁵ See Sherwin Rosen, “Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition,” *The Journal of Political Economy* 82, no. 1 (1974), pp. 34-55.

¹⁶ Examples are *In re: DRAM Antitrust Litigation* and *In re: SRAM Antitrust Litigation*.

collected in the normal course of business by the major e-book retailers: Amazon, Barnes & Noble, Apple, Sony, Kobo, Google, and Books-A-Million. The data include the number of units sold and sales revenue for each e-book title in each week from the week of June 8, 2008 to the week of April 8, 2012, which ends five weeks before the end of the damages period on May 21, 2012. The data also contain information on the publisher, release date, and publication date of all print editions for each title. Only data from e-book titles purchased at least once after April 1, 2010 are included in the data set. Textbooks are the only book genre that was dropped from the data set that was provided by the e-retailers. The resulting data set includes 1,348,121 e-book titles, of which 83,463 titles were sold by the Publisher Defendants. All titles in the period before the collusive agency model was adopted, plus the prices of other e-book titles during the agency period, constitute the “control group” of observations that permits estimation of the effects of price collusion for e-book titles from the Publisher Defendants.

To make analysis of these data more tractable, the weekly data were aggregated into four-week periods for use in econometric estimation. Thus, a unit of observation in the data set is sales of an e-book title for a four-week period through a specific retailer. These same data were used by defendants’ expert Dr. Michelle Burtis and by plaintiffs’ expert Professor Orley Ashenfelter in the liability phase of this litigation, which facilitates comparison of their results with mine.

The e-book release dates were used to create indicator variables for the time the e-book has been available. One variable indicates whether a book is “frontlist” or “backlist” by taking the value 1 if it has been on the market for over a year. Another variable indicates whether the book is a “new release.” To facilitate calculating the effect of the collusive agency model, I adopt the definition of a new release that is used by Amazon, so that the new release indicator

variable takes the value 1 if the e-book has been available for no more than 90 days. This variable captures the fact that the Amazon pricing formula differs for books that have been available for more than 90 days.

The data set includes indicators for whether an e-book title is on a *New York Times* bestseller list. These data identify whether print versions of e-book titles were bestsellers. Six bestseller categories are recorded in the data: hardcover fiction, hardcover nonfiction, hardcover advice/miscellaneous, paperback trade fiction, paperback mass-market fiction, and paperback nonfiction. An e-book title is identified as a given category of bestseller for the period when the corresponding print version of the title is on the relevant list, or for 90 days following the first week it appeared on that list, whichever is longer.

Amazon's genre data are used to group books that are not bestsellers into categories that match the NYT bestseller genres of fiction, nonfiction, and advice as closely as possible. Amazon's genre data also identify an additional category, teens' and children's books. Other Amazon genres are combined as "other," while all titles for which Amazon genre information is not available are placed in an "undefined" category. In addition, two indicators measure whether an e-book title has a corresponding hardcover print edition and a paperback edition, respectively, in each monthly data period.

The regression model uses data from the Bureau of Economic Analysis of the U.S. Department of Commerce on monthly personal consumption expenditures on nondurable goods. This data series permits taking into account the effect of income on the demand for e-books. In addition, a variable is constructed that is the number of months after the introduction of the agency model on April 1, 2010, to take into account trends affecting e-book prices in this period that were not due to the agency model.

Indicator variables are used for each publisher to account for the period in which the agency model was in effect for each retailer. Generally, the five conspiring publishers began using the agency model at all retailers on April 1, 2010, but there are exceptions. Penguin did not have an agency model contract with Amazon until sometime between May 26, 2010 and May 31, 2010.¹⁷ In addition, while Simon & Schuster switched to the agency model with Sony by April 19, 2010,¹⁸ transactions of Simon & Schuster titles at Sony during the four-week period of April 4 to May 1, 2010, cannot clearly be classified as either agency or non-agency. As a result, Sony observations for Simon & Schuster were dropped from the analysis for that period.

A possible complicating factor regarding Macmillan's prices is the so-called "buy button" episode. When Amazon was negotiating a new contract with Macmillan over whether to adopt the agency model, Amazon removed the "buy button" from listings for all Macmillan books, including e-books. The buy buttons were removed no later than January 29, 2010, and were replaced no later than February 6, 2010.¹⁹ To take into account the effect this might have had on Macmillan's prices, an indicator variable was created that is 1 only for a four-week period that includes some of period of this episode. This variable was applied only to Macmillan prices during this period.

Finally, for purposes of allocating sales among states and territories, I use information from Amazon, Barnes & Noble, Apple, and Sony on the location of buyers of e-books.

¹⁷ Bates No. APPLTX00018405. Despite the "most favored retailer" clause in the agency contracts, Penguin typically priced their e-books at Apple and Barnes & Noble at higher prices than those set by Amazon beginning April 1, 2010.

¹⁸ Bates No. SEL-R-0140422.

¹⁹ Bates Nos. MAC 0005005 and MAC 0038987.

Model Specification

Three specification issues had to be addressed in selecting the econometric model to be estimated: (1) the choice of functional form for the regression equation; (2) the procedure for estimating the regression coefficients for indicator variables; and (3) the weights given to observations of different quantities.

The functional form issue is whether the dependent variable is price or the logarithm of price. A regression using price has an advantage of transparency in evaluating coefficients and calculating the dollar effect of the variable of interest, which is the introduction of the agency model. As a matter of economic theory, the logarithm of price is advantageous because the coefficients in the regression that measure the effect of the various independent variables are more plausible percentage effects. In a logarithmic pricing equation, a coefficient is the percentage change in price arising from a one-unit change in the associated independent variable, holding other independent variables constant. Thus, in a logarithmic model of e-book prices, the effect of, say, being a bestseller is that price changes by a percent of the price if the book were not a best seller, not a fixed absolute amount. If the independent variable also is expressed as a logarithm of a continuous variable, such as a measure of income, its regression coefficient is the percentage change in price arising from a one percent change in the independent variable.²⁰ Here I have adopted the logarithmic functional form because percentage price effects are more consistent with the structure of Amazon's pricing formula, discussed elsewhere.

²⁰ The interpretation of coefficients is more complex when independent variables enter interactively. In the equation $\log(P) = A + a_1X + a_2Y + a_3YZ$, where P is price and X and Y are indicator variables that take only the values zero or one and Z is another independent variable, a_1 is the percentage change in P when X changes from 0 to 1. If Y changes from 0 to 1, the percentage change in P is $a_2 + a_3Z$, which means it depends on the value of Z .

The issue regarding the estimation procedure is whether the coefficients on the indicator variables should be estimated using a “fixed effects” model or a “random effects” model. A coefficient in a fixed effects model is an unbiased estimate of the true effect of the indicator variable while the random effects coefficients are biased, but fixed effects estimation is less efficient (the expected absolute error of the estimate is larger) than the random effects method. Here I use the fixed effects model because the coefficients in the fixed effects regression generally are not imprecisely estimated and the equation fits the data well.

The weighting issue is whether the price observations for a specific title should be weighted by the importance of the title in overall sales of e-books. Weighting observations by the quantity sold improves the ability of the estimated equation to predict prices for e-books with greater sales, but reduces the efficiency of price predictions for books with low sales quantities. Because most of the damages are associated with books having a large sales volume, I use quantity-weighted data in estimating the regression equation.

Thus, the specification that I believe is most reliable in this case is a quantity-weighted logarithmic fixed effects model, and my damages estimates are based on this specification. This equation has an adjusted R^2 of 0.90, which means that the model explains 90 percent of the variance in prices among e-book titles.

Results from the Damages Model

To calculate damages for a single sale of an e-book title during a particular four-week period when the collusive agency model was in force, I first use the regression model to calculate the predicted “but-for” price of each e-book title for each four-week period during the collusion period under the assumption that no price collusion had occurred. This calculation is performed

by setting the indicator variable for price collusion equal to zero during the collusion period. I then calculate the difference between the actual price and the predicted competitive benchmark price for that book in that period.²¹

Exhibit 1 reports the results of the regression that calculates the effects of the collusive agency model on the prices of e-books for each publisher by genre category and according to whether the book was a bestseller. In Panel A of Exhibit 1, the columns correspond to publishers and the rows correspond to genre and bestseller categories. A positive entry indicates that the price for that combination of publisher and e-book attribute was elevated by the adoption of the agency model, while a negative value indicates that prices in that category were lower during the collusive agency period. For example, the entry in the upper left is interpreted as indicating that prices for a Hachette e-book that was a hardcover fiction bestseller increased by 0.31 log points (35.7%) due to collusion.

Panel B of Exhibit 1 shows adjustments to the numbers in Panel A to take into account other characteristics of the e-book. For example, the top row indicates that an e-book title for which a hardcover edition is available will have a price that is 0.001 log points less than the price of an e-book title without a hardcover edition, holding other things equal. The combined effect of the panels is to produce different effects of collusion for all combinations of the indicator variables that differentiate e-books. The effect of collusion on a specific title can be determined by starting with the effect for its category in Panel A, then adjusting that effect for other

²¹ Another procedure is to calculate damages as the difference between the predicted price when collusion is present and the predicted but-for price if collusion had not been present during the collusive period. The disadvantage of this procedure is that damages are not calculated as departures from actual prices. The advantage of this procedure is that the indicator variable for the presence of collusion in a fixed effects regression provides an unbiased estimate of damages. The correct statistical interpretation is that differences between actual and predicted cartel prices are due to factors that are not captured in the regression equation. As a practical matter, if the regression equation has good fit, these two methods produce similar results.

characteristics in Panel B. For example, consider a title that is a one-month-old Hachette hardcover fiction bestseller with a hardcover edition but no paperback edition. Exhibit 1 implies that collusion increased the price of this title by 0.226 log points (25.4%). This effect is arrived at by adding the -0.001, -0.078 and 0.31 log point effects for hardcover availability, age under 90 days, and Hachette fiction bestseller, respectively.

The overall results from this model are that collusion increased the price of nearly all types of e-books from all Publisher Defendants. For Macmillan, prices were lower during the collusion period for titles on the advice and mass market paperback bestseller lists, and for new releases of teens' and children's e-books for which a hardcover edition is available. For Hachette, prices were lower in the agency model period only for new release trade paperback fiction bestsellers. Prices also were lower during the agency period for new release Penguin e-books in the "other" category that were not bestsellers. These exceptions account for 0.5% (i.e., one half of one percent) of the unit sales by Publisher Defendants during the collusion period. Total damages can be calculated simply by adding the effects of the price increases for all e-book titles during each four-week period while the agency model was in use.

The period for which consumers experienced damages ends on May 21, 2012, which is after the end of the period in which transactions data were produced. The last four-week period in the damages data ends on March 31, 2012. A reasonable procedure for estimating damages during the additional period is as follows. First, calculate weekly damages for sales through each e-retailer for the last four-week period in the data set. Second, multiply the latter by seven to provide an estimate for the period from April 1 to May 21, 2012. This procedure actually is conservative because it attributes no damages to two extra days in the April-May period.

The total amount of damages from the calculations described above for all Publisher

Defendants is \$307,808,440,²² of which \$282,109,402 was calculated directly from the transactions data and \$25,699,039 was estimated for the last seven weeks of the collusion period. This total does not include reductions in prices for 0.5% of e-books. The total value of these price reductions to consumers during the entire collusion period is \$151,876.

Exhibit 2 shows damages for purchases from each Publisher Defendant. Damages for all e-book titles are \$54,971,904 for Hachette, \$62,033,856 for HarperCollins, \$17,013,854 for Macmillan, \$105,779,666 for Penguin, and \$68,009,160 for Simon & Schuster.

The same procedure for calculating total damages can be used to calculate damages for each consumer who purchased e-books from the Publisher Defendants. Purchase records for an individual consumer show whether that consumer purchased an e-book from a Publisher Defendant during the collusion period and identify the e-book titles that the consumer purchased. Damages are then calculated for each e-book from each Publisher Defendant on a consumer's purchase list for which the price was elevated due to collusion. The sum of damages for all titles is the damages for that consumer. Thus, the method for calculating damages is a common formula for all consumers that identifies the damages and anticompetitive harm from elevated prices for each consumer.

Disaggregation by State

Damages reliably can be disaggregated by state. Four of the leading e-book retailers, accounting for 98 percent of e-book sales, provided data that identify the location of purchasers of e-books. The transactions-level data that were produced by Amazon, Apple, and Sony include a location identifier. For Amazon, the locator is a user-entered text field for the state. For Apple

²² The total number of e-books sold for which damages are calculated is 149,424,374.

and Sony, the locator is the zip code. For Apple and Sony, zip code data were matched to states from the zip code-state correspondence table from the United States Postal Service (USPS).

These transactions records were screened so that the resulting data include only transactions involving Publisher Defendants. The screened transactions were then assigned to the indicated state or territory, or, if location identifiers were missing or indicated a foreign address, to the “unidentified” category, which is discussed more completely elsewhere in this section.

Consumers in three territories are not represented by either group of plaintiffs, so the damages for these consumers were not included in the damages calculations described above.

The result of these calculations is a distribution among states, territories, and the unidentified category of sales by each Publisher Defendant through each retailer. These sales were then aggregated across retailers to produce a distribution of sales by the Publisher Defendants in all states and territories plus an allocation to the unidentified category.

The location identification data from Barnes and Noble and Sony did not cover as long a period as the data from Amazon and Apple. Because of this, overall sales shares into each state were calculated as the weighted average of each state’s sales in the earlier period, where the weights are the retailer’s overall market share of Publisher Defendant titles sold under the agency model. This procedure produced an estimated allocation for the entire period of the transactions data.

Barnes & Noble aggregated its own transactions records to produce total sales for each state plus Washington, D.C. Barnes & Noble’s data for state sales did not report sales to territories or foreign addresses. Sales to each territory were estimated based on the sales-weighted shares into these locations for the other three retailers. The sales shares of Barnes and Noble in each state were then reduced so that the sum of all state, territory and unidentified

percentages was 100 percent.

To allocate damages among consumers who are identified residents of each state and territory and whose residence is not identified, the shares of sales by state, territory, and undefined were then multiplied by total damages. The results are shown in Exhibit 3. The sales shares and damages in this Exhibit cannot deviate materially from the values for all retailers because these four retailers account for 98% of all e-book sales.

Exhibit 3 also shows damages disaggregated into five categories. The first category includes consumers who reside in and are represented by the states and territories that are plaintiffs in this litigation. The second category is consumers who live in other states and territories and are class members. These two categories of consumers account for 93.29 percent of total damages.

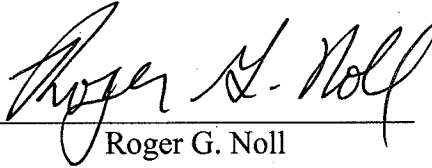
The third category is armed services personnel who are stationed abroad. These consumers reside somewhere in the U.S., but as of the due date for this declaration, data on their places of residence have not yet become available. I am informed by attorneys for the plaintiffs that data for allocating these consumers between the state plaintiffs and the class plaintiffs may become available, in which case I can allocate these damages among the states and territories. The fraction of total damages accounted for by armed forces personnel is 0.33 of one percent.

The fourth category includes consumers with foreign addresses who are not members of the military but whose transactions records were included in the U.S. transactions data that were produced by the e-retailers. Some of these consumers are likely to be U.S. residents who are temporarily living abroad and so are represented in this litigation by either the states or the attorneys for the class. I understand from attorneys for the plaintiffs that information about which of these consumers are U.S. residents may become available, in which case I can allocate

their damages among the states and territories. The damages that are accounted for by the unidentified group is 6.38 percent of the total.

The fifth category is three territories whose residents are not represented in this litigation: Micronesia, Palau, and the Marshall Islands. These consumers represent 0.001 of one percent of total damages to all consumers, and have been removed from my calculation of total damages.

I declare under penalty of perjury that the foregoing is true to the best of my knowledge and belief.


Roger G. Noll

Executed in St. George, Utah, on October 11, 2013.

APPENDIX A

CURRICULUM VITAE
ROGER G. NOLL

PERSONAL

Date and Place of Birth: March 13, 1940, Monterey Park, California

EDUCATION

East High School, Salt Lake City, Utah, 1958
B.S. (Math, Honors), California Institute of Technology, 1962
A.M., Ph.D. (Economics), Harvard University, 1965, 1967

SCHOLARSHIPS, FELLOWSHIPS AND AWARDS

National Merit Scholarship 1958-62
National Defense Education Act Fellowship 1962-66 (declined)
Harvard Prize Fellowship 1962-63
National Science Foundation Fellowship 1963-64
Guggenheim Fellow 1983-84
Rhodes Prize for Undergraduate Teaching, Stanford University, 1994
Distinguished Service Award, Public Utilities Research Center, University of Florida, 2001
Distinguished Lecture Award, Brookings-AEI Joint Center on Regulation and Markets, 2006
Alfred E. Kahn Distinguished Career Award, American Antitrust Institute, 2012
Distinguished Member Award, Transportation and Public Utilities Group, American Economic Association, 2013

POSITIONS HELD

Instructor, California Institute of Technology, 1965-67
Assistant Professor, California Institute of Technology, 1967-69
Senior Staff Economist, Council of Economic Advisers, 1967-68
Associate Professor, California Institute of Technology, 1969-71
Senior Fellow and Co-director, Studies in the Regulation of Economic Activity, Brookings Institution, 1970-73
Professor, California Institute of Technology, 1973-82
Visiting Professor, Graduate School of Business, Stanford University, 1976-77
Chair, Division of the Humanities and Social Sciences, California Institute of Technology, 1978-82
Reuben Gustavson Lecturer, University of Chicago, April 1981
Institute Professor of Social Sciences, California Institute of Technology, 1982-84
Donald Gilbert Memorial Lecturer, University of Rochester, December 1982
Fellow, Center for Advanced Study in the Behavioral Sciences, 1983-84
Professor of Economics, Stanford University, 1984-2006 (*Emeritus* 2006-)
Visiting Scholar, Hoover Institution, 1984-85
Professor by Courtesy, Department of Political Science, Stanford University, 1985-2006
Professor by Courtesy, Graduate School of Business, Stanford University, 1986-2006
Veblen-Clark Lecturer, Carleton College, May 1986
Director, Public Policy Program, Stanford University, 1986-2002
David Kinley Lecturer, University of Illinois, May 1987
Sunderland Fellow, Law School, University of Michigan, Fall 1988

Positions, cont'd

Morris M. Doyle Centennial Professor in Public Policy, Stanford University, 1990-2002
Jean Monnet Professor, European University Institute, Spring 1991
Associate Dean, Humanities and Sciences, Stanford University, 1991-92
Visiting Professor, University of California, San Diego, 1993
Visiting Fellow, Brookings Institution, 1995-96
Nonresident Senior Fellow, Brookings Institution, 1996-99
Director, American Studies Program, Stanford University, 2001-02
Visiting Scholar, London School of Economics, Spring 2001 and Spring 2002
Senior Fellow, American Antitrust Institute, 2002-
Director, Stanford Center for International Development, 2002-06
Kim Thomas Lecturer, Whittier College, 2010

TEACHING EXPERIENCE

Undergraduate: Introductory Economics, Intermediate Microeconomic Theory, Introduction to Econometrics, Antitrust and Regulation, Economic History of Medieval Europe, History of Economic Thought, Economic Policy Analysis, Economics of Sports, Political Economy of the West

Graduate: Antitrust and Regulation, Economic Policy Analysis, Applied Microeconomic Theory, Experimental Economics

RESEARCH INTERESTS

Antitrust and Regulation, Technology Policy, Political Economics, Political Economy of Law

MEMBERSHIP ON BOARDS AND COMMITTEES

President's Task Force on Communications Policy (CEA Staff Representative), 1967-68
President's Task Force on Suburban Problems, 1968
President's Committee on Urban Housing, 1968
President's Task Force on Public Broadcasting, 1968
Department of Commerce Technical Advisory Board Panel on Venture Capital, 1968-69
Committee on the Multiple Uses of the Coastal Zone, National Council on Marine Resources and Engineering, 1968
Secretary, President's Interagency Task Force on Income Maintenance, 1968
Task Force on Application of Economic Analysis to Transportation Problems, National Research Council, 1970-73
Committee on Technological Forecasting on Behalf of the Environment, Office of Science and Technology, 1970-71
Board of Economic Advisers, Public Interest Economics Foundation, 1974-84
Executive Committee, Caltech Environmental Quality Laboratory, 1970-71
Faculty Board, Caltech, 1974-76
Advisory Commission on Regulatory Reform, Senate Committee on Government Operations, 1975-77
Chair, Fourth Annual Telecommunications Policy Research Conference, 1975-76
Committee on Satellite Communications, National Academy of Sciences, 1975-76
Advisory Council, Jet Propulsion Laboratory, 1976-82
Chair, Committee to Monitor the Desegregation Plan of the Los Angeles Unified School District, Los Angeles Superior Court, 1978-79

Boards, cont'd

Advisory Council, National Aeronautics and Space Administration, 1978-81
 Advisory Council, National Science Foundation, 1978-89
 Board of Advisers, National Institute of Economics and Law, 1978-84
 Research Advisory Board, Committee for Economic Development, 1979-82
 President's Commission for a National Agenda for the Eighties, 1980
 Board of Directors, Economists, Inc., 1981-
 Review Panel, NSF Regulation and Public Policy Program, 1981-84
 Board of Editors, Journal of Economic Literature, 1981-90
 Advisory Board, Solar Energy Research Institute, 1982-91
 Board of Directors, Cornell Pelcovits and Brenner, Inc., 1982-1988
 Chair, Advisory Panel on Information Technology R&D, Office of Technology Assessment, 1983-84
 Supervisory Board of Editors, Information Economics and Policy, 1982-88
 Advisory Committee on Integrated Environmental Management Program, Environmental Protection Agency, 1983-85
 Commission on Behavioral and Social Sciences and Education, National Research Council, 1984-90
 Advisory Panel, NSF Policy Research and Analysis Division, 1984
 Director, Program on Regulatory Policy, Stanford Institute for Economic Policy Research, 1984-
 Panel on Clean Air, Science Advisory Board, Environmental Protection Agency, 1985-86
 Board of Editors, Review of Economics and Statistics, 1985-2002
 Contributing Editor, Regulation, 1986-93
 Energy Research Advisory Board, Department of Energy, 1986-89
 President & Chairman of the Board, Telecommunications Policy Research Foundation, 1986-87
 Coordinating Editor, Information Economics and Policy, 1988-92
 Board of Directors, International Telecommunications Society, 1988-92
 Advisory Board of Editors, Journal of Risk and Uncertainty, 1988-
 Acid Rain Advisory Committee, Environmental Protection Agency, 1990-91
 Secretary of Energy Advisory Board, 1990-95
 International Board of Editors, International Journal of the Economics of Business, 1993-
 Faculty Senate, Stanford University, 1993-95, 98-02, 04-06
 California Council on Science and Technology, 1995-2001
 Panel on Universities, President's Committee of Advisors on Science and Technology, 1996
 Committee on Intellectual Property and the Information Infrastructure, National Research Council, 1997-9
 Board of Editors, Journal of Sports Economics, 1999-
 Board of Associate Editors, Economics of Governance, 1999-
 Board of Advisors, American Antitrust Institute, 2000-
 Board on Science, Technology and Economic Policy, National Research Council, 2000-2006
 Committee on Universal Postal Service, National Research Council, 2008

SPONSORED RESEARCH

"Opinions of Policemen." International Association of Chiefs of Police, 1969
 "Studies in the Regulation of Economic Activity." Brookings Institution and Ford Foundation, 1970- 3
 "Government Policies and Technological Innovation." National Science Foundation National R&D Assessment Program, 1973-4
 "The Social Consequences of Earthquake Prediction," National Aeronautics and Space Administration, 1974-6
 "Nuclear Safety Regulation." National Science Foundation RANN Program, 1975-7
 "The Public Television Station Program Cooperative." National Science Foundation RANN Program, 1975-7
 "The Station Allocation Game." Federal Communications Commission, 1977
 "Energy Policy Studies." Various donors, 1978-84

Sponsored Research, cont'd

"Economics of Oil Leasing" and "Issues in Utility Pricing." Department of Energy, 1978-9
 "The Economics of Boxing, Wrestling and Karate." California Athletic Commission, 1978
 "Implementing Tradable Emissions Permits." California Air Resources Board, 1979-82
 "Social Science and Regulatory Policy." National Science Foundation, 1980-2
 "The Political Economy of Public Policy." National Science Foundation and Center for Economic Policy Research, Stanford University, 1983-4
 "SIEPR Program on Regulatory Policy." various donors, 1987-
 "The Economics of Research Universities and Scholarly Communication." Brown Center for Education Policy, Brookings Institution, 1995-6
 "Coordination of Regulatory Reform," Organization for Economic Cooperation and Development, 1996
 "The Future of the Research University," Carnegie Foundation, 1996
 "SCID Program in Economic Policy Reform," Various donors, 2002-06

CONSULTING

Special Assistant to the President, Ford Foundation, 1969
 Space Technology Applications, Jet Propulsion Laboratory, 1969
 Panel on the Abatement of Particulate Emissions, National Research Council, 1971
 Sloan Commission on Cable Communications, 1971
 President's Commission on Government Procurement, 1971
 Senate Subcommittee on Antitrust and Monopoly, 1971-72
 MCI, Inc., 1972-73, 1983, 1986
 National Science Foundation, 1973, 1975
 Department of Justice, Antitrust Division, 1974-77, 1979-81, 1993-97
 Internal Revenue Service, 1976-77
 RAND Corporation, 1974-82
 Los Angeles Lakers, 1974-75
 National Football League Players Association, 1974-76, 1987-93, 2008, 2010-
 Office of Telecommunications Policy, 1975-77
 National Basketball Association Players Association, 1975-76, 1987-88, 1994
 Naval Ordnance Test Station, 1975
 Commission on Law and the Economy, American Bar Association, 1977-78
 Aspen Institute Program on Communications and Society, 1977
 National Commission on Electronic Funds Transfer, 1977
 Business Round Table, 1978
 Federal Communications Commission, 1977-81
 Food and Drug Administration, 1978
 Carnegie Commission on the Future of Public Broadcasting, 1978
 Department of Energy, 1979
 Office of Technology Assessment, 1980
 Kerr-McGee Corporation, 1980
 CBS, Inc. 1982-83
 Environmental Protection Agency, 1982-83
 Showtime/The Movie Channel, 1983, 1985
 Harlequin Books, 1984
 Lake Huron Broadcasting, 1984
 National Collegiate Athletics Association, 1984
 National Medical Enterprises, 1985, 1987-88
 Camellia City Telecasters, 1985-86

Consulting, cont'd

Brown and Root, Inc., 1985-86
 McDermott, Inc., 1985-86
 Major League Baseball Players Association, 1985, 1994
 United Cable Television and American Television and Communications, 1985
 United States Football League, 1985-86
 City of Anaheim, 1986
 Technicolor, 1986
 Metro-Mobile, 1986-89
 Hewlett-Packard, 1986-1990, 1991
 Echostar, 1987, 1994-95, 2002-03, 2004-05
 Continental Airlines, 1987-88
 Home Box Office, 1988-89
 Bell South Cellular, 1989
 Western Union, 1989
 Minnesota Twins, 1989
 Northwest Airlines, 1989
 Pepsico, 1989
 Yellow Phone, 1989-91
 Dialog, 1990-91
 California Public Utilities Commission, 1989-90
 American Newspaper Publishers Association, 1990
 Humana, 1990-91
 Powell, Goldstein, Frazer and Murphy, 1990-93
 South Coast Air Quality Management District, 1990-91
 Federal Trade Commission, 1990-91, 2010-
 Delta Airlines, 1991
 California Cable Television Association, 1991
 Bureau of Competition Policy, Government of Canada, 1991
 R&D Business Systems, *et al.* 1991-95
 International Entertainment Group, 1992-93
 Nike, Inc., 1992
 World Bank, 1992-
 Gemini, Inc. 1992-94
 Servicetrends, Inc., 1993-94
 William Sullivan, 1993-95
 Sure Safe Industries, 1993
 U. S. Department of Justice, Civil Division 1994-95
 Kopies, Inc., *et al.* 1995-1999
 Telecom Technical Services, *et al.*, 1995-1999
 Digital Distribution, Inc.. 1996-1999
 Silvey, *et al.*, 1996-2000
 Aguillar, *et al.* 1996-2000
 Wadley Medical Center, 1997-2001
 Oakland Raiders, 1997-2000
 Major League Soccer Players Association, 1997-2000
 Class Plaintiffs, Brand Name Prescription Drugs Litigation, 1998-9
 Class Plaintiffs, Compact Disc Litigation, 1999-2003
 Class Plaintiffs, State Microsoft Antitrust Litigation (California, Iowa, Minnesota, New York), 2000-2007
 Kingray, 2000
 Napster, 2000-2

Consulting, cont'd

Metropolitan Intercollegiate Basketball Association, 2002-5
 Congressional Budget Office, 2002
 Pioneer and Scientific Atlanta, 2002-3
 Lenscrafters, 2003-4, 2009-12
 Seven Network, 2003-7
 Sports Car Clubs of America, 2003-05
 Intertainer, 2003-05
 Class Plaintiffs, DRAM Antitrust Litigation 2005-7
 Class Plaintiffs, Honeywell Antitrust Litigation, 2005-
 Class Plaintiffs, Tableware Antitrust Litigation, 2005-7
 Class Plaintiffs, *White, et al., v. NCAA*, 2006-8
 Sirius Satellite Radio and XM Satellite Radio, 2006-7, 2011-12
 Class Plaintiffs, Cartier Antitrust Litigation, 2006-7
 Monte Carlo Country Club and Société Monégasque pour l'Exploitation du Tournoi de Tennis, 2007
 Pearle Vision, Inc., 2007-8
 Class Plaintiffs, Apple iTunes/iPod Antitrust Litigation, 2007-
 Class Plaintiffs, SRAM Antitrust Litigation, 2007-9
 Fair Isaac, 2007-9
 Houston Baptist University, 2008.
 U. S. Department of Justice, U. S. Attorney's Office, San Francisco, 2008-9
 Novell, 2008-11
 GlaxoSmithKline, 2008-11
 Class Plaintiffs, Flash Memory Antitrust Litigation, 2008-10
 MobiTV, 2009-10
 AT&T, 2009-10
 Verizon, 2009-10
 Ericsson, 2009-10
 Kaleidescape, 2011-12
 Class Plaintiffs, Text Messaging Antitrust Litigation, 2011-
 Class Plaintiffs, California Automobile Insurance Antitrust Litigation, 2011-
 Class Plaintiffs, NCAA Student-Athlete Name and Likeness Licensing Litigation, 2011-

BOOKS AND MONOGRAPHS

Reforming Regulation: An Evaluation of the Ash Council Report. Brookings Institution, 1971.

Economic Aspects of Television Regulation, co-authors Merton J. Peck and John J. McGowan. Brookings Institution, 1973. Winner, National Association of Educational Broadcasters Annual Book Award, 1974.

Government and the Sports Business, editor. Brookings Institution, 1974.

The Political Economy of Deregulation, co-author Bruce Owen. American Enterprise Institute, 1983.

Regulatory Policy and the Social Sciences, editor. University of California Press, 1985.

The Technology Pork Barrel, co-author Linda R. Cohen. Brookings Institution, 1991.

The Economics and Politics of Deregulation. European University Institute, 1991.

Books, cont'd

Constitutional Reform in California: Making State Government More Effective and Responsive, co-editor Bruce E. Cain. University of California Institute of Governmental Studies, 1995.

Sports, Jobs, and Taxes, co-editor Andrew Zimbalist. Brookings Institution, 1997.
Challenges to Research Universities, editor. Brookings Institution, 1998

A Communications Cornucopia, co-editor Monroe E. Price. Brookings Institution, 1998.

The Economics and Politics of the Slowdown in Regulatory Reform. AEI Press, 1999.

The Digital Dilemma, 17 co-authors (Committee on Intellectual Property Rights and the Emerging Information Infrastructure). National Academy Press, 2000.

Bridging the Digital Divide, editor. California Council on Science and Technology, 2001.

Economic Reform in India, co-editors Nicholas C. Hope, Anjini Kochar, and T.N. Srinivasan. Cambridge University Press, 2013

ARTICLES IN SCHOLARLY PUBLICATIONS

"Urban Concentration: Prospects and Implications." In *Increasing Understanding of Public Problems and Policies*. Farm Foundation, 1969.

"Metropolitan Employment and Population Distribution and the Conditions of the Urban Poor." In *Financing the Metropolis: Public Policy in Urban Economics: The Urban Affairs Annual Reviews*, IV, John P. Crecine, ed. Sage Publications, 1970. Brookings Reprint No. 184.

"National Communications Policy: Discussion--Spectrum Allocation Without Markets." *American Economic Review Papers and Proceedings* 60(2) (May 1970).

"The Behavior of Regulatory Agencies." *Review of Social Economics* 24(1) (March 1971): 15-19. Brookings Reprint No. 219 (November 1971).

"Summary and Conclusions," co-author William Capron. In *Technological Change in Regulated Industries*, William Capron, ed. Brookings Institution, 1971.

"The Nature and Causes of Regulatory Failure." *Administrative Law Review* 23(4) (June 1971): 424-437. Revised version published as "The Economics and Politics of Regulation." *Virginia Law Review* 57(6) (September 1971): 1016-1032.

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APPENDIX B

APPENDIX B – MATERIALS REVIEWED

PRODUCED DOCUMENTS:

AMZN-TXCID-0000345-365
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APPENDIX B – MATERIALS REVIEWED

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PEN772161-62
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APPENDIX B – MATERIALS REVIEWED

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APPENDIX B – MATERIALS REVIEWED

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TESTIMONY:

June 3, 2013 Reporter's Transcript of Proceedings (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
June 4, 2013 Reporter's Transcript of Proceedings (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
June 5, 2013 Reporter's Transcript of Proceedings (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
June 10, 2013 Reporter's Transcript of Proceedings (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
June 12, 2013 Reporter's Transcript of Proceedings (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Deposition: Murray, Brian – March 22, 2013
Deposition: Sargent, John – January 25, 2013
Deposition: Shanks, David – March 21, 2013

OTHER DOCUMENTS:

July 17, 2013 Opinion and Order (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
[Proposed] Second Amended Complaint, <i>State of Texas et al. v. Penguin Group (USA) et al.</i> , No. 12-cv-3394 (DLC) (S.D.N.Y.)
January 20, 2012 Consolidated Class Action Complaint, <i>In re Electronic Books Antitrust Litigation</i> , No. 11-md-2293 (DLC) (S.D.N.Y.)
[Proposed] Consolidated First Amended Class Action Complaint, <i>In re Electronic Books Antitrust Litigation</i> , No. 11-md-2293 (DLC) (S.D.N.Y.)

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February 8, 2013 Report of Orley Ashenfelter in Connection with State of Texas et al. v. Penguin Group (USA), Inc. et al.
March 1, 2013 Rebuttal Report of Orley Ashenfelter in Connection with State of Texas et al. v. Penguin Group (USA), Inc. et al.
February 8, 2013 Expert Report of Jonathan B. Baker
March 1, 2013 Rebuttal Report of Jonathan B. Baker
February 8, 2013 Expert Report of Dr. Michelle Burtis on Behalf of Apple Inc., Holtzbrinck Publishers, LLC d/b/a Macmillan and Penguin Group (USA) Inc.
March 1, 2013 Rebuttal Expert Report of Dr. Michelle Burtis on Behalf of Apple Inc., Holtzbrinck Publishers, LLC d/b/a Macmillan and Penguin Group (USA) Inc.
February 8, 2013 Expert Report of Richard J. Gilbert
March 1, 2013 Expert Report of Richard J. Gilbert
February 8, 2013 Expert Report of Professor Benjamin Klein, Ph.D. on Behalf of Apple Inc.
March 1, 2013 Rebuttal Report of Professor Benjamin Klein, Ph.D. on Behalf of Apple Inc.
February 8, 2013 Expert Report of Professor Kevin M. Murphy
March 1, 2013 Rebuttal Expert Report of Professor Kevin M. Murphy
February 8, 2013 Expert Report of Professor Daniel L. Rubinfeld on Behalf of Holtzbrinck Publishers, LLC d/b/a Macmillan and Penguin Group (USA) Inc.
March 1, 2013 Expert Rebuttal Report of Professor Daniel L. Rubinfeld on Behalf of Holtzbrinck Publishers, LLC d/b/a Macmillan and Penguin Group (USA) Inc.
Trial Exhibit: DX-434 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-435 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-449 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-473 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-719 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-720 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-721 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: DX-724 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)
Trial Exhibit: PX-1097 (<i>United States v. Apple Inc.</i> , No.

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12-cv-2826)
Trial Exhibit: PX-1105 (<i>United States v. Apple Inc.</i> , No. 12-cv-2826)

W. Kip Viscusi, Joseph E. Harrington, Jr., and John M. Vernon, <i>Economics of Regulation and Antitrust</i> , 4th Edition, MIT Press, 2005
Roger D. Blair and David L. Kaserman, <i>Antitrust Economics</i> , Richard D. Irwin, 1985
John Johnson, "Economic Approaches to Antitrust Damage Estimation," NERA Economic Consulting, January 2005.
John M. Connor, "Forensic Economics: An Introduction with Special Emphasis on Price Fixing," Amsterdam Centre for Law and Economics, ARP No. 2006-17888, March 2006.
Sherwin Rosen, "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," <i>The Journal of Political Economy</i> 82, no. 1 (1974),

Exhibit 1

(A)	Hachette		Harper- Collins		Macmillan		Penguin		Simon & Schuster	
	Log Points	Percent	Log Points	Percent	Log Points	Percent	Log Points	Percent	Log Points	Percent
NYT bestseller - hardcover fiction	0.31	35.7	0.32	37.3	0.25	28.5	0.34	40.5	0.34	40.0
NYT bestseller - hardcover nonfiction	0.33	38.5	0.31	36.1	0.17	19.0	0.40	48.8	0.41	50.8
NYT bestseller - hardcover advice	0.38	46.0	0.22	25.1	-0.48	-38.4	0.36	43.7	0.30	35.0
NYT bestseller - trade paperback Fiction	0.07	7.2	0.29	33.0	0.14	15.4	0.33	39.5	0.22	24.1
NYT bestseller - paperback nonfiction	0.15	16.1	0.30	34.8	0.11	11.5	0.36	43.1	0.24	26.5
NYT bestseller - mass-market paperback fiction	0.23	25.9	0.32	37.6	0.08	8.1	0.18	19.7	0.21	23.4
Non-NYT bestseller - fiction	0.27	31.1	0.32	37.1	0.11	11.6	0.29	33.3	0.29	33.4
Non-NYT bestseller - nonfiction	0.18	20.2	0.23	25.3	0.08	8.7	0.29	33.8	0.33	38.9
Non-NYT bestseller - advice	0.18	19.5	0.25	28.2	0.08	7.9	0.27	30.8	0.33	38.7
Non-NYT bestseller - teen's and children's	0.28	31.7	0.29	33.7	0.08	8.2	0.22	24.5	0.23	26.3
Non-NYT bestseller - other	0.15	16.6	0.26	29.4	0.12	12.2	0.05	5.2	0.29	33.6
Non-NYT bestseller - unidentified genre	0.21	23.0	0.17	18.3	0.24	27.6	0.21	24.0	0.30	34.6
(B)	Log Points									
Hardcover version available	-0.001									
Paperback version available	0.0002									
Frontlist, non-new release (91-365 days)	-0.047									
New release (under 90 days)	-0.078									

(Notes over)

Exhibit 1

Notes to Exhibit 1

The dependent variable is the average price (in natural logarithms) for a given e-book title, retailer, and month.

Panel A presents the mean difference in e-book price (expressed in logarithms) from the period prior to agency pricing to the period following agency pricing for e-books of the specified type published by the specified publisher, given that the e-book is older than one year and has no print versions available. Panel B presents adjustments to the agency price effect for newer titles and titles with hardcover or paperback versions available.

The regression analysis adjusts for factors specific to each title, the effect of becoming a NYT bestseller of each type, whether a hardcover version of the title was available, whether a paperback version of the title was available, whether the title was less than a year old, whether the title was less than 90 days old, whether the observation was affected by the 'buy button' incident, non-durable consumption in the month of the observation, and a month time trend. The adjusted R-squared is 0.90.

Percentage differences are expressed as a percentage of the price in the absence of agency.

Exhibit 2

Revenue and Damages, by Publisher

	Revenue ¹	Damages Percentage ²	Damages
Hachette	\$ 280,353,406	19.6%	\$ 54,971,904
HarperCollins	\$ 279,204,717	22.2%	\$ 62,033,856
Macmillan	\$ 212,238,723	8.0%	\$ 17,013,854
Penguin	\$ 481,408,086	22.0%	\$ 105,779,666
Simon & Schuster	\$ 295,019,098	23.1%	\$ 68,009,160
Total	\$1,548,224,030	19.9%	\$ 307,808,440

1. The period for which I have been asked to calculate damages extends beyond the period included in my data. As a result, I have projected the revenue for the missing weeks based on data from March 4, 2012 to March 31, 2012, the last complete four-week period in my data.
2. Weighted average of the effects of collusion on e-book prices expressed as a percentage of actual prices.

Exhibit 3

Damages Attributable to Each State

State/Territory	Percent of Sales	Damages
Alabama	1.080	\$3,323,384.98
Alaska	0.463	\$1,424,310.59
American Samoa	0.001	\$3,007.06
Arizona	2.051	\$6,312,016.36
Arkansas	0.681	\$2,096,450.18
California	10.780	\$33,181,127.83
Colorado	2.050	\$6,310,928.92
Connecticut	1.496	\$4,604,344.92
Delaware	0.291	\$894,830.43
District of Columbia	0.364	\$1,119,058.04
Florida	5.772	\$17,765,844.94
Georgia	2.700	\$8,312,395.47
Guam	0.021	\$65,676.93
Hawaii	0.405	\$1,247,556.46
Idaho	0.468	\$1,439,820.46
Illinois	3.728	\$11,474,221.76
Indiana	1.529	\$4,706,568.57
Iowa	0.841	\$2,588,696.23
Kansas	0.824	\$2,536,825.03
Kentucky	0.924	\$2,843,747.95
Louisiana	1.073	\$3,303,821.49
Maine	0.425	\$1,309,104.56
Maryland	2.156	\$6,635,033.22
Massachusetts	2.741	\$8,437,173.56
Michigan	2.407	\$7,407,958.83
Minnesota	1.728	\$5,317,854.52
Mississippi	0.538	\$1,656,381.73
Missouri	1.515	\$4,664,758.83
Montana	0.341	\$1,050,486.19
Nebraska	0.472	\$1,453,251.82
Nevada	0.826	\$2,542,630.11
New Hampshire	0.586	\$1,802,686.02
New Jersey	3.160	\$9,728,241.93
New Mexico	0.590	\$1,816,092.15
New York	6.416	\$19,750,066.84
North Carolina	2.525	\$7,771,197.68
North Dakota	0.209	\$642,656.45

State/Territory	Percent of Sales	Damages
Northern Mariana Islands	0.002	\$6,211.40
Ohio	2.666	\$8,205,908.83
Oklahoma	1.029	\$3,168,618.34
Oregon	1.274	\$3,921,904.94
Pennsylvania	3.766	\$11,591,065.11
Puerto Rico	0.076	\$234,224.69
Rhode Island	0.337	\$1,036,056.29
South Carolina	1.263	\$3,887,161.37
South Dakota	0.217	\$667,219.79
Tennessee	1.570	\$4,833,363.94
Texas	7.536	\$23,196,443.59
U.S. Virgin Islands	0.024	\$74,983.03
Utah	0.850	\$2,616,013.12
Vermont	0.227	\$699,503.97
Virginia	3.245	\$9,987,971.89
Washington	2.978	\$9,165,209.65
West Virginia	0.409	\$1,259,894.32
Wisconsin	1.409	\$4,337,560.94
Wyoming	0.236	\$726,468.93
Armed Forces Americas ¹	0.007	\$21,267.04
Armed Forces Africa, Canada,		
Europe, Middle East ¹	0.209	\$642,122.40
Armed Forces Pacific ¹	0.116	\$355,741.48
Federated States of Micronesia ²	0.000	\$709.48
Marshall Islands ²	0.001	\$1,644.67
Palau ²	0.000	\$882.54
Unidentified ³	6.378	\$19,633,315.87
Subtotal For Plaintiff States	55.414	\$170,571,439.84
Subtotal For Class States	37.875	\$116,584,553.32
Subtotal For Armed Forces	0.331	\$1,019,130.92
Subtotal For Unidentified	6.378	\$19,633,315.87
Excluded Territories	0.001	\$3,236.68
Total after exclusions	99.999	\$307,808,439.95

1. The Armed Forces zip codes represent military members whose state of residence is unknown

2. Federated States of Micronesia, Marshall Islands, and Palau have valid USPS zip code data, but are not included in either the Class or Plaintiff States, and damages are not being claimed for these consumers

3. This represents transactions which were not identified as being into a U.S. state or territory, but which were included in the U.S. sales databases provided by retailers